Wisconsin
Department of Commerce

Evaluation # 200257-W

Safety & Buildings Division
201 West Washington Avenue
P.O. Box 2658
Madison, WI 53701-2658

Wisconsin
Building Products Evaluation

Material	Laminated Veneered Lumber (LVL)
Manufacturers	Pacific Woodtech Corporation 1850 Park Lane Burlington, Washington 98233 Capital Lumber Company 2111 East Highland Avenue, Suite 155 Phoenix, Arizona 85016 Franklin Building Supply Company 11700 Franklin Road Boise, Idaho 83709 Roseburg Forest Products 4500 Riddle By-Pass Road Riddle, Oregon 97469

SCOPE OF EVALUATION

GENERAL: This report evaluates the use of Pacific Woodtech Laminated Veneer Lumber (PWLVL), manufactured by Pacific Woodtech Corporation, for use as structural framing lumber (engineered).

This review includes the cited **Comm** code requirements below in accordance with the current **Wisconsin Uniform Dwelling Code for 1 & 2 family dwellings:**

Structural: Pacific Woodtech Laminated Veneer Lumber (PWLVL) was evaluated for use in dry locations, and not limited to beams, headers, joists, lintels, tension lamination stock, rafters, truss chords, rim boards and wood "I" joist flanges in accordance with **s. Comm 21.02(3)(a)2.** and **s. Comm 21.19**.

This review includes the cited **International Building Code (IBC)** requirements below in accordance with the **Wisconsin Amended IBC Code:**

Structural: Pacific Woodtech Laminated Veneer Lumber (PWLVL) was evaluated for use in dry locations, and not limited to beams, headers, joists, lintels, tension lamination stock, rafters, truss chords, rim boards and wood "I" joist flanges in accordance with **s. IBC. 2301.2, 2301.2.1, 2303.1, 2303.1.2, 2306.1, 2306.1.1** and **2306.1.2**.

DESCRIPTION AND USE

GENERAL: Pacific Woodtech Laminated Veneer Lumber (PWLVL) is intended for use in dry locations, and not limited to beams, headers, joists, lintels, tension lamination stock, rafters, truss chords, rim boards and wood "I" joist flanges. The product is a structural composite lumber consisting of laminated Douglas Fir veneers with grain parallel to the face of the member. An exterior-type phenol-formaldehyde adhesive, complying with the requirements of ASTM D2559, is used in the manufacture of the LVL, to bond the veneers in a lay-up pattern specified in the approved quality control manual.

Pacific Woodtech's Laminated Veneer Lumber PWLVL that is evaluated in this approval are 1.5E, 1.8E and 2.0E. Pacific Woodtech Laminated Veneer Lumber (PWLVL) 1.8E and 2.0E is available in thickness from ¾-inch (19.1 mm) to 3 ½ inches (89 mm), depths from 1 ¾ inches (44.5 mm) to 24 inches (610 mm), and lengths up to 66 ½ feet (20,269 mm). Pacific Woodtech 1 ¼-inch x 1.5E Rim Board is 1 ¼-inches (31.7 mm) thick and a maximum of 16 inches (406 mm) deep.

Pacific Woodtech Laminated Veneer Lumber (PWLVL) may be trademarked G-P Lam® and distributed by Georgia-Pacific Corporation. Private labels include, but are limited to, the companies shown as additional manufacturers/listees in this evaluation.

TESTS AND RESULTS

Table 1 – ALLOWABLE DESIGN PROPERTIES FOR PACIFIC WOODTECH LVL (psi)[1]

DESIGN PROPERTY		1.5E GRADE	1.8E GRADE	2.0E GRADE
Flexural stress, F_b[5,6]	beam[2,4]	2250	2750	3100
	plank[3]	2250	2750	3100
Modulus of elasticity, E	beam[2]	1,500,000	1,800,000	2,000,000
	plank[3]	1,500,000	1,800,000	2,000,000
Horizontal shear, F_v[6]	beam[2]	220	285	285
	plank[3]	150	150	150
Compression perpendicular to grain, $F_{c\perp}$	beam[2]	575	850	850
	plank[3]	435	450	450
Tension parallel to grain, F_t[6,7]		1500	1950	2100
Compression parallel to grain, F_c[6]		1950	2300	2750

For SI: 1 psi = 6.89 kPa, 1 inch = 25.4 mm.

[1]The tabulated design properties apply to protected, dry service conditions.
[2]Beam values apply to members loaded and supported on faces showing the narrow edge of all veneers, typically the narrow faces of the member.
[3]Plank values apply to members loaded and supported on faces showing the face of one veneer, typically the wide faces of the member.
[4]The tabulated flexural stress for beam orientation is based on a reference depth of 12 inches. For other depths (d inches), the tabulated flexural stress for beam orientation shall be adjusted by multiplying by a size factor of $(12/d)^{1/8}$ for 1.5E grade, or $(12/d)^{1/5}$ for 1.8E and 2.0E grades, as shown below:

Depth (inches)		1 ¾	3 1/2	5 ½	9 ½	11 7/8	14	16	18	24
Multiply by	1.5E	1.27	1.17	1.10	1.03	1.00	0.98	0.96	0.95	0.92
	1.8E & 2.0E	1.47	1.28	1.17	1.05	1.00	0.97	0.94	0.92	0.87

Use the factor for 1 ¾ inches for shallower depths. The size factor shall be cumulative with duration-of-load and Repetitive-member adjustment factors.

[5]The tabulated flexural stresses are permitted to be increased by 4 percent for repetitive members as provided in the code.
[6]The tabulated design stresses are permitted to be adjusted for duration of load as provided in the code for solid sawn lumber.
[7]The tabulated tension parallel to grain stress is based on a reference gage length of 4 feet. For other lengths (*L* feet), the tabulated tension parallel to grain stress shall be adjusted by multiplying by a factor of $(4/L)^{1/8}$ for 1.5E grade, or $(4/L)^{1/10}$ for 1.8E and 2.0E grades.

TABLE 2- 1 ¼-INCH x 1.5E RIM BOARD DESIGN PROPERTIES[1,2,3]

PARAMETER	VALUE
Lateral load transfer capacity[4]	200 plf[5]
Vertical load transfer capacity	3450 plf
½ diameter lag screw or bolt lateral load capacity	350 lbs

For SI: 1 inch = 25.4 mm, 1 plf = 14.59 N/m.

[1]The tabulated design properties apply to protected, dry service conditions.
[2]The tabulated design properties may be adjusted for duration of load, as provided in the code, except where noted.
[3]Other design properties are as provided for 1.5E grade Pacific Woodtech LVL in Table 1 of this evaluation.
[4]The tabulated lateral load trandfer capacity applies to a ten-minute wind or earthquake load duration (C_D = 1.33). No increase is permitted for duration of load.
[5]I ¼-inch x 1.5E Rim Board may be substituted for solid-sawn framing in horizontal wood diaphragms as required in **s. IBC 2305** provided the maximum shear values for the diaphragms are limited to the allowable lateral load capacity noted in this table.

TABLE 3 – EQUIVALENT SPECIFIC GRAVITY FOR CONNECTION DESIGN

PW LVL GRADE	1.5E		1.8E and 2.0E	
Connection type	Face	Edge	Face	Edge
Nail—withdrawal	0.42	0.42	0.50	0.50
Nail—lateral	0.42	0.39	0.50	0.47
Bolt--lateral	0.42	NA	0.50	NA

Face: Member faces showing the face of one veneer, typically the wide faces of the member.
Edge: Member faces showing the narrow edge of all veneers, typically the narrow faces of the member.

TABLE 4 – MINIMUM EDGE FASTENER SPACING

LVL DIMENSIONS	FASTENER[1]	MINIMUM SPACING (inches)
Minimum ¾ inch thick And 3 ½ inches deep	8d nail	3
	10d nail	4
	12d nail	4
	16d nail	Not permitted
	14 gage staple	4
Minimum 1 ¼ inch thick and 3 ½ inches deep	10d nail	4
	12d nail	4
	16d nail	6[2]
	14 gage staple	4

For SI: 1 inch = 25.4 mm

[1]Nails are either common or box nails.
[2]May be 4 inches when nailing through bottom wall plate and sheathing (maximum 1 3/8 inches penetration).

Pacific Woodtech Corporation's Quality Assurance Manual is on file with the department.

- Tension tests in accordance with ASTM D198 (APA Report T99P-20 and APA Report T2001P-52) were performed.
- Compression tests perpendicular to the grain were performed in accordance with ASTM D143 (APA Report T99P-20 and APA Report T2001P-52).
- Compression tests parallel to the grain were performed in accordance with ASTM D198 (APA Report T99P-20 and APA Report T2001P-52).
- Horizontal shear testing in accordance with ASTM D143 (APA Report T99P-18, APA Report T99P-20 and APA Report T2001P-52).

- Lateral Nail Capacity and Lateral Nail Withdrawal testing in accordance with ASTM D1761 (APA Report T99P-21 and APA Report T2001P-52) were also performed.
- Mechanical property tests were performed in accordance with ASTM D5456. Allowable design values were assigned in accordance with ASTM D5456 (APA Report T99P-18, APA Report T99P-20 and APA Report T2001P-52) and other appropriate standards.
- All mechanical property testing was conducted and/or witnessed by independent test laboratories or third party inspection agencies (APA). Test data and results are on file with the department.

LIMITATIONS OF APPROVAL

This evaluation number permits the use of allowable design stresses as specified. It does not take the place of structural calculations for assemblies using Pacific Woodtech Laminated Veneer Lumber (PWLVL) when required by **Chapters Comm 20-25** or **IBC Chapter 23**. Applications not covered by this evaluation and requiring special considerations may be handled by contacting Pacific Woodtech Corporation for guidance and submitted for review when required by **Chapters Comm 20-25** or **IBC Chapter 23**.

The design provisions for solid-sawn lumber in the National Design Specification ® for Wood Construction (NDS®) ANSI/AF&PA NDS, except as modified herein, shall be used in the design Pacific Woodtech Laminated Veneer Lumber (PWLVL). The allowable unit stress for dry-use

Design and Allowable Stresses: Allowable design properties for the Pacific Woodtech Laminated Veneer Lumber (PWLVL) 1.8E and 2.0E are provided in **Table 1**. Allowable design properties for 1 ¼-inch x 1.5E Rim Board are provided in **Table 2**. Unless otherwise noted, adjustment of the LVL design stresses for duration of load is permitted in accordance with the **s. Comm 21.02(3)** of the Uniform Dwelling Code and **s. IBC 2306** of the commercial code. Allowable stresses for LVL and Rim Board apply to protected, dry service conditions, such as those environmental conditions that result in an equilibrium moisture content of less than 16 percent in sawn lumber.

The allowable lateral load transfer capacity of 1 ¼-inch x 1.5E Rim Board used as the boundary element of horizontal diaphragms, transferring in-plane lateral loads from the diaphragm to the wall plate below, is 200 plf (2919 N/m). This lateral load transfer capacity shall not be increased for duration of load. The Rim Board is allowed for use in structures complying with conventional light-framed construction in accordance with **s. IBC 2308**.

All design values, with the exception of F_c perpendicular-to-grain and modulus of elasticity, may be adjusted for duration of load per NDS. The allowable bending stress, F_b, of members that qualify as repetitive members, as defined in NDS, may be increased by 4%.

CONNECTIONS: Allowable withdrawal and lateral loads for nails installed in the faces and the edges of LVL members are the same as those provided in **s. IBC 2304.9** for sawn lumber having a minimum specific gravity as shown in **Table 3**. Allowable lateral loads for bolts installed in the faces of LVL members, with loads applied parallel or perpendicular to the grain of the wood veneers, are the same as those provided in **s. IBC 2304.9** for sawn lumber having a minimum specific gravity as shown in **Table 3**. **Bolted connections made in the edges of LVL members are not permitted.**

Spacing, edge distance and end distance of fasteners installed in the face of LVL members (member faces showing face of one veneer, typically the wide face of the member) are the same as those in **s. IBC 2304.9** for sawn lumber. Spacing of fasteners installed in the edges of LVL members (member faces

showing the narrow edge of all veneers, typically the narrow face of the member) is limited as shown in **Table 4**.

Other connections not covered in this evaluation require design by a licensed professional, signed and sealed.

IDENTIFICATION: Pacific Woodtech Laminated Veneer Lumber (PWLVL) covered by this report shall be identified by a mill stamp indicating: product name, manufacturer's name and/or trademark, grade, plant number, quality control agency name and/or trademark and the Wisconsin Product Evaluation Number 200257-W.

This approval will be valid through December 31, 2007, unless manufacturing modifications are made to the product or a re-examination is deemed necessary by the department. The Wisconsin Building Product Evaluation number must be provided when plans that include this product are submitted for review.

DISCLAIMER

The department is in no way endorsing or advertising this product. This approval addresses only the specified applications for the product and does not waive any code requirement not specified in this document.

Revision Date:
Approval Date: January 30, 2003 By: _____

Lee E. Finley, Jr.
Product & Material Review
Integrated Services Bureau

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